

## EFFORTS TO IMPROVE MATHEMATICS LEARNING OUTCOMES ON FRACTIONAL MATERIAL BY USING A JIGSAW-TYPE COOPERATIVE LEARNING MODEL

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**Abstract.** The low learning outcomes of students in mathematics subjects of fractional material for class VII of SMP Negeri Mapar Mimika, are behind this study. The research method used is Classroom Action Research with the Kemmis and Taggart models which have been implemented for two cycles. Each cycle consists of planning, action, observation, and reflection. The subjects of this study were grade VII students of SMP Negeri Mapar Mimika. Data collection techniques consist of observation, observation, documentation, and learning outcomes tests. The research instrument consists of teacher activity sheets, student activity sheets and learning outcomes tests. The results showed that: 1) Efforts to improve student learning outcomes after using the jigsaw-type cooperative learning model in Cycle I obtained an average score of 64.3% with a percentage of 60%, when carried out in cycle II so that it experienced an average increase in grades of 71.3% with a percentage of success of 80%. 2) The jigsaw-type cooperative learning model runs optimally, as evidenced by the results of the first cycle of student activity by 70% (enough). Increased to 76 % (good) in cycle II. The results of teacher activity in the first cycle were 66% (sufficient), increased to 77% (good) in cycle II.

**Keywords:** Learning Outcomes, Jigsaw Type Cooperative Model, Fractional

**Abstrak.** Rendahnya hasil belajar siswa pada mata pelajaran matematika materi pecahankelas VII SMP Negeri Mapar Mimika, melatar belakangi penelitian ini. Metode penelitian yang digunakan adalah Penelitian Tindakan Kelas (PTK) dengan model Kemmis dan Taggart yang telah dilaksanakan selama dua siklus. Setiap siklus terdiri perencanaan, tindakan, observasi dan refleksi. Subyek penelitian ini adalah siswa kelas VII SMP Negeri Mapar Mimika. Teknik pengumpulan data terdiri observasi, observasi, dokumentasi, dan tes hasil belajar. Instrumen penelitian terdiri lembar aktivitas guru, lembar aktivitas siswa dan tes hasil belajar. Hasil penelitian menunjukkan bahwa: 1) Upaya meningkatkan hasil belajar siswa setelah menggunakan model pembelajaran kooperatif tipe *jigsaw* pada Siklus I memperoleh nilai rata-rata 64,3% dengan persentase sebesar 60%, saat dilakukan di siklus II sehingga mengalami peningkatan rata-rata nilai sebesar 71,3% dengan persentase keberhasilan sebesar 80%. 2) Model pembelajaran kooperatif tipe *jigsaw* berjalan optimal, dibuktikan dengan hasil aktivitas siswa siklus I sebesar 70% (*cukup*). Meningkatkan menjadi 76 % (*baik*) pada siklus II. Hasil aktivita guru pada siklus I sebesar 66 % (*cukup*), Meningkatkan menjadi 77% (*baik*) pada siklus II.

**Kata Kunci:** Hasil Belajar, Model Kooperatif Tipe *Jigsaw*, Pecahan

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## INTRODUCTION

Education plays an important role in efforts to improve the quality of human resources, and an activity to improve one's general knowledge including increasing mastery of theory and skills, deciding and finding solutions to problems related to activities in achieving their goals, be it problems in the world of education or daily life A. Rasul. (2022), formal education in an organization is a process of developing capabilities in the direction desired by the organization concerned.

In addition, education also plays a strategic role for the community. The back and forth of the quality of civilization of a society depends largely on the quality of education organized by the community. Through education a person can develop and increase the potential that exists in himself. Education is not only intended for personal development but also as a fundamental part of the development of a country. This is contained in the Law. No.20 of 2003, that Indonesian education aims to make the Indonesian people have self-control, personality, intelligence, noble character and the skills needed for themselves, society, nation and state. Education can be obtained formally through an institution. One of the educational institutions is a school, whose main activity is to carry out the teaching and learning process. The teaching and learning process is the interaction between related components (teachers, students, curriculum, facilities and infrastructure) in schools or in the classroom. The teaching and learning process is a pillar of success in achieving educational goals. Students who learn are expected to experience changes in both the fields of knowledge, understanding, skills, values and attitudes. One of the indicators used as a tool to measure the success rate of the implementation of the teaching and learning process is learning outcomes. From the learning outcomes, it can be known whether students have mastered the material that has been taught by the teacher. Therefore, teachers as learning agents are required to have the ability or competence in fields related to the implementation of teaching in the classroom.

Based on an interview on March 27, 2019, the learning model used by teachers of SMP Negeri Mapar Mimika class VII learning mathematics is a lecture method. The subject of the teacher's mathematics is still the main role. This event caused students to become passive and the low quality of grades of class VII mathematics learning outcomes at Mapar Mimika State Junior High School. So it causes not all of them to be able to achieve the KKM (Minimum Completion Criteria) value. From the results of the class VII test for the 2019 school year, the targeted KKM is 70.

As for the results of the observation of students' daily test results on fractional material, the study that formulated by class VII teachers was only 5 students who were able to achieve

KKM (33.3%) out of 15 students. It concluded that 10 students did not meet learning outcomes or 66.6%. From the problems that occurred in class VII, to help improve the literacy and understanding of students, researchers tried a jigsaw learning model to compensate for the lecture method. The type of jigsaw learning model that can be applied is the cooperative learning model (Cooperative learning) forming small groups consisting of heterogeneous. Heterogeneous groups such as expertise in academics, learner background, and gender) (Rasul, 2020).

## **METHOD**

This type of research is Classroom Action Research. Heidi Watts defines action research as a process where teachers study learning practices that are carried out systematically and carefully using research methods. The research approach used in this study is a qualitative and quantitative approach. 1) Qualitative approach is the approach used to obtain data from the observation of learning implementation. 2) Quantitative approach is an approach used to obtain data from students' mathematics learning outcomes tests after the teaching and learning process using a jigsaw-type cooperative learning model.

The subject in this Class Action Research is a grade VII student of SMP Negeri Mapar Mimika for the 2019/2020 school year. The subjects of this study were 15 people consisting of 7 male students and 8 female students. The research design used in this study was the Arikunto model. This model is carried out through four steps, namely planning, acting, observing, and reflecting. The step can be described in the following scheme. This activity is carried out by observers or observers to monitor the learning process that takes place using a Jigsaw-type cooperative learning model. Observations are carried out using observation instruments for student activities and teacher performance. The observation sheet is filled in by the observer.

The data in this study were collected using observation methods, tests, and documentation. Observation activities are carried out by researchers by looking at the condition of students and teachers in carrying out the learning process as well as activities and behaviors in the classroom. During the learning process, develop historical learning actions using the model. Cooperative Learning type Jigsaw. Observation is carried out using an observation sheet that has been prepared. The observation manual is an observation sheet to evaluate student behavior in the classroom and learning carried out by the teacher, all these activities are observed and recorded in the observation sheet with behavioral indicators by scoring in the indicator column to be assessed. The test is a systematic and objective tool or procedure to obtain the desired data or information about a person, in a way that can be said to be precise and fast<sup>6</sup> This method is

used to measure the ability of Class VII students of Mapar Mimika State Junior High School. Documentation is incorrect one way to collect data that is difficult to obtain through oral or written from sources in the form of people or goods. The author uses this method to obtain data on the organizational structure of the school, teacher data, student data, data on infrastructure at Mapar Mimika State Junior High School.

The collected data consists of qualitative and quantitative data. The steps to analyze qualitative data according to Mills and Huberman in Sugiyono (2018:246-252) are as follows data reduction, data display, and conclusion drawing/verification. Analysis of learning outcomes student math after carrying out the learning process teaching jigsaws in each the cycle is carried out with how to give an evaluation or measurement of learning outcomes in the form of written tests at each end cycle. Permanent researchers using a KKM value of 70 as a reference for passing the results learn.

**Table 1.** Learning outcomes criteria

No	Value Scale	for Completion level of Learning Outcomes
1	85-100	Excellent (L)
2	70-84	Good (L)
3	50-69	Low (TL)
4	0-49	Very Low (TL)

Learn To know percentage of student learning outcomes class VII learning completion as follows:

**Table 2.** Criteria for percentage of completion of learning outcomes

No	Value Scale	for Completion level of Learning Outcomes
1	85% -100%	Excellent (L)
2	70% - 84%	Good (L)
3	50% - 69%	Low (TL)
4	0 - 49%	Very Low (TL)

Researchers continue to use the KKM score of 70 as a reference for passing learning outcomes. By looking for the average score of one class by dividing the number of students. Providing scores on student learning activities is obtained from the results of observations using student learning activity sheets. After the results of observations of student learning activities are obtained and then analyzed with the criteria for student learning activities. After analysis, the student activity score is calculated and averaged with the following formula Daryanto, (2011).

**Table 3.** Student observation value criteria

No	Value Scale	for Completion level of Learning Outcomes
1	85 -100	Excellent (L)
2	70 - 84	Good (L)
3	50 - 69	Low (TL)
4	0 - 49	Very Low (TL)

To achieve the target of success in conducting this study, the researcher formulated the following performance indicators (1) the value of learning outcomes achieved is at least 70, (2) the average score of student learning outcomes  $\geq 70$ , (3) the percentage of completion of learning outcomes is at least 70% or 10 students out of 15 students achieve completeness of learning outcomes, (4) teacher activity score of at least  $>80$ , and (5) student activity score of at least  $>80$ .

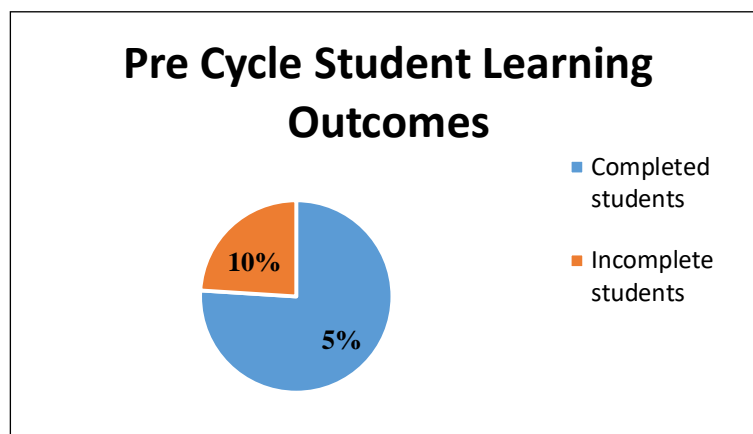
## RESULTS

This chapter discusses the results of action research that has been carried out in this study. The implementation of this class action research is to improve mathematics learning outcomes in class VII of SMP Negeri Mapar Mimika by using a jigsaw-type cooperative learning model. This study was carried out as many as two cycles, each cycle consisting of four meetings. Qualitative data is obtained in the form of observations on student and teacher activities during the mathematics learning process while quantitative data in the form of student learning outcomes are carried out at the last meeting at the end of each cycle, namely the fourth meeting. Cycle I was held on June 18 2020-21 June 2020 and cycle II held on July 06, 2020 until July 14, 2020. The following will be explained about the stages of action planning, action implementation, observation of student learning outcomes data and teacher or student activities and the stages of reflection analysis carried out in cycle I and cycle II. The implementation of this research stage consists of pre-cycle, cycle I, and cycle II.

Please use 12-point font size. Please margin the text to the justified. Manuscripts should be 1.5 times spaced. A paragraph should have at least 3 sentences. All relevant information should be included in main text. Do not indent paragraphs; leave a 1.5 times space of one line between consecutive paragraphs. Do not underline words for emphasis. Use italics instead. Both numbered lists and bulleted lists can be used if necessary. Before submitting your manuscript, please ensure that every in-text citation has a corresponding reference in the reference list. Conversely, ensure that every entry in the reference list has a corresponding in-text citation

## Pre Cycle

The pre-cycle stage is carried out on Wednesday' date June 12, 2020, the pin first came to the school to ask permission from the school which one could conduct class action research. Based on the results of observations and interviews conducted by researchers on June 12, 2020 in class VII of SMP Negeri Mapar Mimika on the subject of mathematics, the addition and subtraction of two fractions with different denominators, the average score obtained by students was 67.6 out of 15 students, 5 students who reached KKM with a percentage of 33.3% while 10 students who had not reached the KKM score with a percentage of 66.6%. The Minimum Completion Criteria (KKM) for mathematics subjects are 70. The following is data on the results of student written tests conducted by teachers before class action research mathematics subjects' fractional material that get a score below KKM 70:



**Figure 1.** Pre-Cycle diagram of student learning outcomes

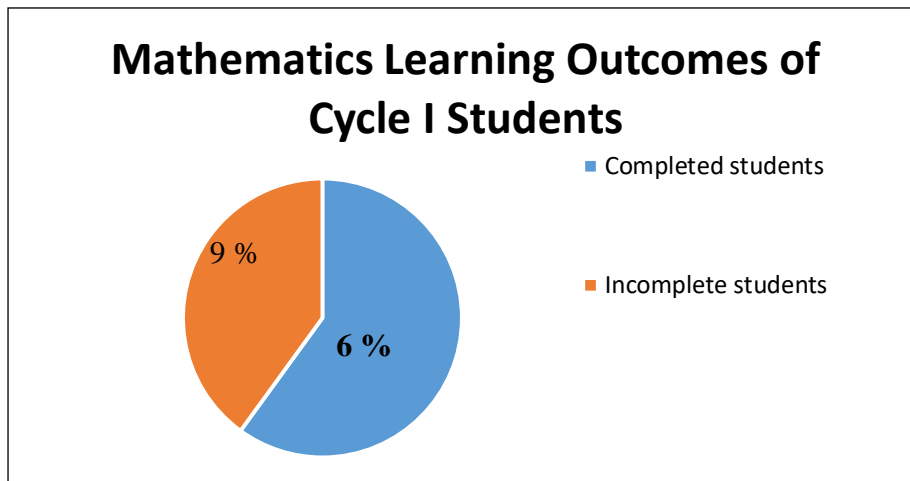
Based on Figure above, it shows that the acquisition of hasi from the student's pre-cycle on fractional material still did not achieve maximum results. So it can be concluded that the learning outcomes of grade VII students of SMP Negeri Mapar Mimika on the subject of fractional material mathematics are still low. And it is evident from the average score of students still 67.6 (low). The score is still below the KKM set from the school, which is 70. Of the KKM set, only 5 students scored above KKM, and the other 10 students were still unable to reach the number of KKM. So that it can be calculated in the percentage of completeness of learning individuals as a whole amounting to 45.1 % (very less).

## Cycle I

The first cycle of activities was held on Thursday 18 to 20 June 2020. Each cycle is carried out with several stages which include planning, implementation, observation, and reflection. Learning activities in cycle I and cycle II were carried out 4 times, 3 times for learning activities

using a jigsaw type cooperative learning model and 1 time for the end of the cycle test. Each meeting was held for  $2 \times 45$  minutes with a total of 15 students. This test was held on Tuesday, June 23, 2020, which was attended by 15 students. The results of the final test of the student's cycle I can be seen in the appendix. If the student's earned score is grouped into five categories, a distribution of grades and percentages is obtained as shown in table 4.4 below:

This test was held on Tuesday, June 23, 2020, which was attended by 15 students. The results of the final test of the student's cycle I can be seen in the appendix. If the student's earned scores are grouped into five categories, a distribution of grades and percentages is obtained in the following diagram:



**Figure 2.** Diagram of mathematics learning outcomes of cycle I

Based on Figure 2 shows the acquisition of mathematics learning skills in Cycle I. Fractional material still has not achieved maximum learning results. Because the number of completed students is as many as 9 students and the number of students who are not completed is as many as 6 students. So it can be concluded that the learning outcomes of grade VII students of SMP Negeri Mapar Mimika on the subject of fractional material mathematics are still low. And it is evident from the average score of students is still 64.3% (low).

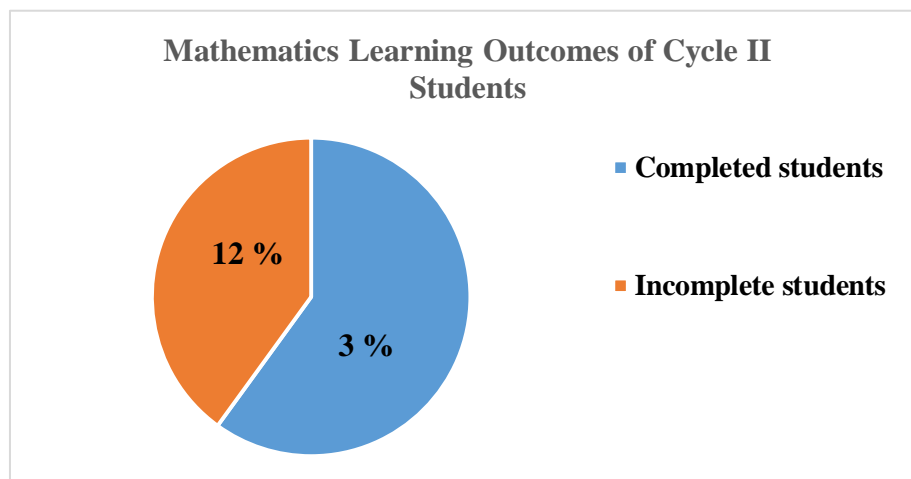
Based on table 4.5 above, it shows that the acquisition of hasi from Cycle I on fractional material still has not achieved maximum learning results. So it can be concluded that the learning outcomes of grade VII students of SMP Negeri Mapar Mimika on the subject of fractional material mathematics are still low. And it is evident from the average score of students is still 64.3% (low). With the completion of the student's learning score of 60%. The score is still below the KKM set from the school, which is 70. Because in the first cycle the percentage of success is still below 70%, and the average class score is still below 70.

Therefore, it is still necessary to implement cycle II to improve student learning outcomes, so that they can achieve predetermined criteria.

## Cycle II

Cycle II is an improvement over cycle I using the same strategy, namely the jigsaw-type cooperative learning model. In the implementation of cycle II, there is an improvement and learning process, it is known from the results of the reflection of cycle I. The stages to be applied in cycle II are the same as those carried out by researchers in cycle I, namely there are 4 stages, each cycle consists of 4 steps, namely: action planning, action implementation, observation/obsevation and reflection. After three meetings were held in cycle II, the learning outcomes test was carried out with a test instrument that had been prepared before, namely in the form of a description test. The number of question items is 5 items and must be done all by students. The scoring of test results refers to the criteria that have been set.

This test was held on Monday, July 13, 2020, which was attended by 15 students. The results of the final test of the student's cycle II can be seen in the appendix. If the student's earned score is grouped into five categories, a distribution of grades and percentages is obtained as in the following diagram:



**Figure 3.** Diagram of mathematics learning outcomes of cycle II

Based on Figure 3, it shows the acquisition of mathematics learning skills in Cycle II. Fractional material has achieved maximum learning results. Because the number of students completed is as many as 12 students and the number of students who are not completed is as many as 3 students. So it can be concluded that the learning outcomes of grade VII students of SMP Negeri Mapar Mimika on the subject of fractional material mathematics have increased.

And it is evident from the average score of students still 71.3% (Good). This score has reached the KKM score set from the school, which is 70.

## DISCUSSION

The research that has been carried out in this ii cycle, namely cycle I and cycle II, is a class action research to improve student learning outcomes in fractional material mathematics subjects through a jigsaw-type cooperative learning model in grade VII students of Mapar Mimika State Junior High School. Based on the research that has been carried out, the following results are obtained:

### *Using a Jigsaw-Type Cooperative Learning Model*

In the first cycle the teacher's activity obtained a final score of 71 (Enough), and the student activity obtained a final score of 70 (enough), with enough chimeria and not yet reaching the performance indicators. As for the acquisition of teacher and student activity scores, at least reach 80 with good categories. In cycle II learning after the researchers made improvements to the activities of teachers and students that were not optimal. Teacher activity and student activity showed an improvement in better results than in cycle I. Total teacher activity scores in cycle II were 83 (good) and the score was included in the good performance indicator. Meanwhile, the student activity score in cycle II also increased, namely with a score of The 76 (good) score is included in the indicator of completeness with good chitoeria.

It is known that there is an increase in teacher activity and student activity. Teacher activity in cycle I got a score of 71 (enough), an increase of 83 in cycle II. Meanwhile, student activity in cycle I got a score of 70 (enough), and in cycle II it increased with a score of 76. Thus it can be concluded that by applying the jigsaw-type cooperative learning model to class VII of SMP Negeri Mapar Mimika can be applied to mathematics subjects of fractional material to improve student learning outcomes on the fractional material.

### *Improved Jigsaw Type Cooperative Learning Outcomes*

Based on the results of research from the pre-cycle obtained from the results of the daily assignments of grade VII students of SMP Negeri Mapar Mimika fractional material, it is known that the value of student learning outcomes has not partially reached the predetermined KKM and this can be seen in the table described earlier. That only 5 students were able to achieve KKM (33.3%) out of 15 students. It concluded that 10 students did not meet learning outcomes or 66.6%. Learning outcomes from cycle I have improved compared to student

learning outcomes in the pre-cycle, in the pre-cycle stage it has not applied the jigsaw-type cooperative learning model. This improvement consists of one aspect which is cognitive.

Based on research data on the value of cognitive aspects in cycle I and cycle II, there were 2 students whose scores fell and 3 grades were fixed and 10 students whose scores increased. In the first cycle, some students still cannot achieve the minimum grades that have been targeted. This is because in the first cycle many students are less focused on learning steps using jigsaw strategies so some prefer to joke alone, just shut up and be less active. However, in cycle II, it can be seen that many students have increased their grades and have reached the targeted scores. This can happen because students begin to understand the instructions on the application of the jigsaw type cooperative learning model so that students are more active during the learning process and there are 2 students whose grades have dropped, one of the among them cycle I gets a value of 75, and cycle II gets a value of 70. This can happen because students at the time of application of the jigsaw-type cooperative learning model are not so enthusiastic or so active. After the researcher checked the LKS, some of the incorrect answers were due to the instructions of the teacher who were not understood, and he did not want to ask questions. After the first cycle and cycle II, namely by carrying out mathematics learning of fractional material using a jigsaw-type cooperative learning model, student learning outcomes have improved. The increase occurred in the average score of students in cycle I of 64.3 and increased in cycle II of 71.3.

## **CONCLUSION**

Based on the results of research and discussion related to efforts to improve student learning outcomes, mathematics subjects of fractional material using a Jigsaw-type cooperative learning model, can be concluded as follows (1) efforts to improve student learning outcomes have increased after using the Jigsaw-type cooperative learning model, as evidenced in the first cycle, namely an average score of 64.3% with a percentage of 60%. And experienced an increase in cycle II the average value to 71.3% with a success percentage of 80%, and (2) using a Jigsaw-type cooperative learning model on fractional material goes well. The presentation can be proven by the value of teacher and student activities. The score of teacher activity in cycle I, which was 71, increased in cycle II to 83. And the value of student activity in cycle I, which is 70, then increases in cycle II to 76.

## RECOMMENDATIONS

Based on the research conducted, efforts to improve mathematics learning outcomes on fractional material by using a jigsaw-type cooperative learning model for keas VII students of Mapar Mimika State Junior High School. Teachers are expected to take place when delivering material, not only using the lecture method, and also not only explaining while sitting in a chair. However, learning time will be more fun and memorable for students if the teacher applies various strategies, one of which is the Jigsaw-type cooperative learning model. So that students during learning time are not easily bored or easily forgotten, but learning will be easier for students to remember and learning outcomes can increase. Teachers and schools are expected to be able to use a Jigsaw-type cooperative learning model in all classes, not only in class VII. Because the jigsaw-type cooperative learning can be applied to the lower and upper grades to make it easier for students to solve problems in mathematics subjects.

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